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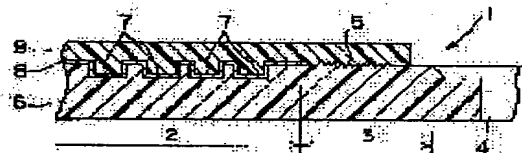
TAKEUCHI TAKASHI

(54) INFORMATION RECORDING MEDIUM AND ITS PRODUCTION

(57)Abstract:

PURPOSE: To surely identify whether an information recording medium is genuine or not by viewing by forming a hologram on a substrate.

CONSTITUTION: An optical disk is formed of a transparent substrate 6 consisting of glass, etc., information bits 7 formed on this substrate 6, a reflection layer 8, a protective layer 9, etc. The hologram 5 is formed as plural pieces of ruggedness of a depth smaller than the depth of the bits 7 on the substrate 6 of the non-information region 3 of this disk 1. The hologram 5 is not read by coherent light for reading the bit 7 information and is not reproduced. Then, whether the optical disk, etc., are genuine or not is always identified when the hologram 5 image is viewed, unlike the case of sticking a peelable hologram to the disk.



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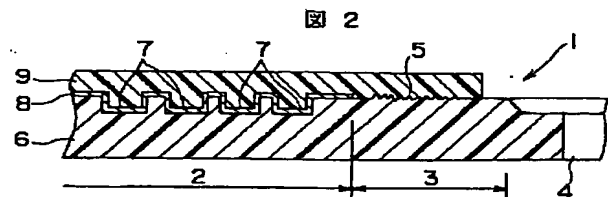
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(54) 【発明の名称】 情報記録媒体及びその製造方法

(57) 【要約】

【目的】 情報記録媒体を目視により真性品か否かを確実に識別する。

【構成】 光ディスク1の基板6自体に、ビット7として記録されている情報とは別に、ホログラム5が形成されている。



【特許請求の範囲】

【請求項1】基板に複数のビットが光により再生可能な情報として形成されている情報記録媒体において、前記ビットとして記録されている情報とは別に、前記基板自体にホログラムが形成されていることを特徴とする情報記録媒体。

【請求項2】前記基板に形成されているホログラム上に、透明な保護層が形成されていることを特徴とする請求項1記載の情報記録媒体。

【請求項3】前記ホログラムは、前記基板に複数の凹凸として形成され、

前記凹凸は、前記ビットのビット深さより小さく、且つ、該ビットを情報として読み出す際に複数の凹凸で形成された前記ホログラムを読み出すことができない凹凸差であることを特徴とする請求項1又は2記載の情報記録媒体。

【請求項4】前記基板には、複数の前記ビットが形成される情報記録領域と、該ビットがまったく形成されない無情報領域とが形成され、

前記ホログラムは、前記無情報領域に形成されていることを特徴とする請求項1、2又は3記載の情報記録媒体。

【請求項5】前記基板には、複数の前記ビットが形成される情報記録領域と、該ビットがまったく形成されない無情報領域とが形成され、

前記ホログラムは、前記情報記録領域に形成されていることを特徴とする請求項1、2又は3記載の情報記録媒体。

【請求項6】請求項1、2、3、4又は5記載の情報記録媒体の製造方法において、

特定の板材上にホトレジストを塗布し、該ホトレジスト上に、前記ビットとなるビットパターン及び前記ホログラムとなる干渉パターンを写し込み、該ホトレジストを現像処理して、該ホトレジスト上で感光した部分のみを取り除いて、前記ビット及び前記ホログラムが形成された原版を作成し、

前記原版を元にスタンプを作成し、

前記スタンプを元に、前記ビット及び前記ホログラムが形成された前記基板を作成し、

前記基板上に、反射層及び保護層を形成することを特徴とする情報記録媒体の製造方法。

【請求項7】請求項4記載の情報記録媒体の製造方法において、

前記基板の前記情報記録領域を形成するための情報記録領域用板材と、前記無情報領域を形成するための無情報領域用板材とを準備し、

前記情報記録領域用板材上にホトレジストを塗布し、該ホトレジスト上に、前記ビットとなるビットパターンを写し込み、該ホトレジストを現像処理して、該ホトレジスト上で感光した部分のみを取り除いて、前記ビットが

形成された情報記録領域用原版を作成する一方で、

前記無情報領域用板材上にホトレジストを塗布し、該ホトレジスト上に、前記ホログラムとなる干渉パターンを写し込み、該ホトレジストを現像処理して、該ホトレジスト上で感光した部分のみを取り除いて、前記ホログラムが形成された無情報領域用原版を作成し、

前記情報記録領域用原版及び前記無情報領域用原版を組み合わせ、一の原版を作成して、該一の原版を元にスタンプを作成し、又は、前記情報記録領域用原版及び前記無情報領域用原版を組み合わせ、直接スタンプを作成し

前記スタンプを元に、前記ビット及び前記ホログラムが形成された前記基板を作成し、

前記基板上に、反射層及び保護層を形成することを特徴とする情報記録媒体の製造方法。

【請求項8】請求項5記載の情報記録媒体の再生装置において、

前記情報記録媒体にコヒーレント光を当てると共に、該情報記録媒体からの反射光を受ける光ピックアップと、前記光ピックアップからの信号レベルが予め定めたレベルか否かを判断し、予め定めたレベルを超える信号を出力する判断手段と、

前記判断手段から出力された信号を再生する再生手段と、

を備えていることを特徴とする情報記録媒体の再生装置。

【請求項9】特定の母材に、光又は磁気により再生可能な情報が記録されている情報記録媒体において、

前記所定の情報とは別に、前記母材自体にホログラムが形成されていることを特徴とする情報記録媒体。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、光又は磁気により再生可能な情報が記録されている情報記録媒体に係り、特に、それが真性ものであるか偽性のものであるか、目視により判断できる情報記録媒体、その製造方法、及びその再生装置に関する。

【0002】

【従来の技術】従来、偽造防止を図るものとしては、例えば、特公昭63-168397号公報に記載されたものがある。この技術では、キャッシュカード等のカード類に、いわゆるホログラムシートを貼付し、カード類の偽造防止を図っている。

【0003】

【発明が解決しようとする課題】しかしながら、前記従来技術では、ホログラムシートが一旦剥がされてしまうと、それが真性品であるか偽性品であるかが判別できなくなり、真性品を十分に保護することができないという問題がある。

【0004】本発明は、このような従来の問題点に着目してなされたもので、真性品を偽造からより確実に保護

することができる情報記録媒体、その製造方法、及びその再生装置を提供することを目的とする。

【0005】

【課題を解決するための手段】前記目的を達成するための情報記憶媒体は、光又は磁気により再生可能な情報が記録されている母材自体に、該情報とは別に、ホログラムが形成されていることを特徴とするものである。

【0006】ここで、前記情報記憶媒体としては、光ディスクや光カードのように、光により再生可能なものの他、光磁気ディスクや磁気ディスクや磁気カードのように、磁気により再生可能なものも含まれる。また、前記母材は、具体的には、情報記憶媒体が例えば光ディスクである場合には、ビットが形成された基板の他、保護層や反射層等も含まれる概念である。

【0007】また、前記情報記憶媒体が、光ディスクのように、基板に複数のビットが光により再生可能な情報として形成されているものでは、ホログラムを形成する複数の凹凸の凹凸差が、ビット深さより小さく、且つ、ビットを情報として読み出す際に複数の凹凸で形成されたホログラムを読み出すことができない凹凸差であることが望ましい。また、この光情報記憶媒体において、基板上に形成されている情報記録領域と無情報領域とのうち、いずれか一方に、又は両方に、ホログラムを形成してもよい。

【0008】また、前記目的を達成するための光情報記憶媒体の製造方法は、特定の板材上にホトレジストを塗布し、該ホトレジスト上に、ビットとなるビットパターン及びホログラムとなる干渉パターンを写し込み、該ホトレジストを現像処理して、該ホトレジスト上で感光した部分のみを取り除いて、前記ビット及び前記ホログラムが形成された原版を作成し、該原版を元にスタンプを作成し、該スタンプを元に、前記ビット及び前記ホログラムが形成された基板を作成し、該基板上に反射層及び保護層を形成することを特徴とするものである。

【0009】また、情報記憶領域にホログラムを形成した光情報記録媒体の再生に好適な再生装置は、光情報記録媒体にコヒーレント光を当てると共に、該情報記録媒体からの反射光を受ける光ピックアップと、該光ピックアップからの信号レベルが予め定めたレベルか否かを判断し、予め定めたレベルを超える信号を出力する判断手段と、該判断手段から出力された信号を再生する再生手段と、を備えていることを特徴とするものである。

【0010】

【作用】ホログラムは、その作成条件や、その再生条件を一致させないと忠実な再生ができないので、それ自体を忠実に複製することは非常に難しい。また、ホログラムは、光又は磁気により再生可能な情報が記録されている母材自体に形成されているので、真性品の情報記憶媒体の母材には、必ずホログラムが形成されている。すなわち、ホログラムシートのように、母材から剥がされ

て、真性品か偽性品か区別ができなくなるようなことはない。従って、ホログラムの有無、又はホログラムの違いにより、その記憶媒体が真性品か偽性品かを確実に区別することができる。また、ホログラムの有無やホログラムの違いは、目視により可能なので、真性品か偽性品かの判断を容易に行うことができる。

【0011】また、情報記憶媒体が、いわゆる光ディスクのように、基板に複数のビットが光により再生可能な情報として記録されているものでは、基板に形成したホログラムの凹凸差を、ビット深さより小さく、且つ、ビットを情報として読み出す際に複数の凹凸で形成されたホログラムを読み出すことができない凹凸差にしておけば、複数のビットが形成されている情報記録領域にホログラムを形成しても、ビット情報を明瞭に再生することができる。さらに、ビットに特定の光を当てて、ビットを情報として読み取ろうとしても、ホログラム自体は読み取れないので、光情報記録媒体を再生して複製しようとしても、ホログラムは再生されず、単純には複製することができない。

【0012】

【実施例】以下、本発明に係る各種実施例について図面を用いて説明をする。まず、図1及び図2を用いて、本発明に係る情報記録媒体の第1の実施例について説明する。

【0013】本実施例の情報記録媒体は、基板上にビット状に情報を記録し、コヒーレント光で情報を読出して再生する光ディスクである。図1に示すように、この光ディスク1は、外周側にビット状の情報が記録されている情報記録領域2が形成され、その内周側に無情報領域3が形成され、中心部に再生装置に装着するためのスピンドル孔4が形成されている。無情報領域3には、ホログラム5が形成されている。図2は、図1のA-A断面図である。光ディスク1は、例えば、ポリカーボネート、エポキシ樹脂、ガラスなどの透明な基板6と、基板6の情報記録領域2上に形成されたアルミニウム等から成る反射層8と、反射層8上に形成された紫外線硬化(UV)樹脂などからなる透明な保護層9とを有して構成されている。基板6の情報記録領域2には、複数のビット7、7、…が同心円状あるいはスパイラル状に形成されている。また、基板6の無情報領域3には、凹凸状のホログラム5が形成されている。

【0014】ホログラム5は、その一部が傷がついても再生像に与える影響は少ないため、積極的にカバーする必要は必ずしもないが、ここでは、ホログラム5への傷付きを完全に防止するため、無情報領域3に形成したホログラム5の上にも、保護層9を形成している。この際、保護層9として透明材料を用いると共に、透明な基板6に形成したホログラム5から波面再生光が得られるよう、基板6と保護層9を形成する材料の屈折率に差をもたせておく必要がある。なお、ホログラム5は、白色

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光あるいは、レーザ光で再生像がえられるものならなんでもよい。ホログラム 5 に光を照射した時、ホログラム 5 として記録されている物体、図形、文字パターン等が波面再生されるため、目視によりこの物体、図形、文字パターン等が認識できる。ここで、ホログラム 5 として記録する物体、図形、文字パターン等としては、光ディスク 1 の製造元を表すものや、光ディスク 1 に記録されているビット情報の内容のある程度示すもの等が考えられる。

【0015】次に、本発明に係る第 2 の実施例の光ディスクについて、図 3 を用いて説明する。本実施例の光ディスク 1 a は、ホログラム 5 上にも、反射層 8 を形成したもので、その他に関しては、第 1 の実施例と同様である。このように、凹凸のホログラム 5 上にも、反射層 8 を形成することにより、反射による波面再生光量が多くなり、ホログラム 5 の再生像を目視し易くなる。

【0016】次に、本発明に係る第 3 の実施例及び第 4 の実施例の光ディスクについて、それぞれ、図 4、図 5 を用いて説明する。第 3 の実施例の光ディスク 1 b は、図 4 に示すように、情報記録領域 2 の一部分(あるいは全領域の部分でもよい)にホログラム 5 を形成したものである。ホログラム 5 は、情報記録領域 2 のビット 7 の無いところと、ビット 7 の中の両方に渡って形成されている。また、図 5 に示すように、第 4 の実施例の光ディスク 1 c は、情報記録領域 2 内のビット 7 の無いところにホログラム 5 を形成したものである。このように、情報記録領域 2 にホログラム 5 を形成すると、ホログラム 5 自体を大きくすることができ、ホログラム 5 として記録されている物体、図形、文字パターン等をより容易に目視できるようになる。但し、このように、情報記録領域 2 にホログラム 5 を形成する場合には、ビット情報を再生する際に、ホログラム 5 として記録されている情報が再生されないようにする必要がある。

【0017】ここで、図 6 を用いて、第 3 及び第 4 の実施例の光ディスク 1 b、1 c のビット情報を再生する際に、ホログラム 5 として記録されている情報が再生されないための条件について説明する。なお、同図においては、図面を簡略化するために反射層及び保護層を描いていない。一般的に、光ディスクでは、情報ビット 7 の深さ d は、情報ビット 7 を再生するコヒーレント光の波長 λ の $1/4$ である。このような光ディスクを対象とする一般的な光ディスク再生装置では、コヒーレント光の波長 λ の $1/10$ 以下の凹凸を再生することができない。そこで、第 3 及び第 4 の実施例の光ディスク 1 b、1 c では、ホログラム 5 の凹凸差 d_1 をコヒーレント光の波長 λ の $1/10$ 以下にしている。なお、ここでは、ホログラム 5 の凹凸差 d_1 をコヒーレント光の波長 λ の $1/10$ 以下にしているが、これは、あくまでも、光ディスク再生装置との関係において定まるものであるから、ホログラム 5 の凹凸差 d_1 が $\lambda/10$ である必要はなく、

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光ディスク装置により、ホログラム 5 を情報として再生できない値以下であればよい。このようにしておけば、ホログラム 5 自体を忠実に複製するのが難しいのに加え、ホログラム 5 の凹凸が読み取ることができないため、このような光ディスク 1 b、1 c を複製することが非常に難しくなる。

【0018】以上のように、各実施例における光ディスク 1、1 a、1 b、1 c では、基板 6 自体にホログラム 5 が形成されているので、ホログラムシートのように基板から剥がされることもなく、且つ、ホログラム自体を忠実に再生することが難しいため、基板 6 自体に形成されたホログラムの有無やホログラムの違いから、その光ディスクが真性品か偽性品かを確実に区別することができる。また、ホログラムの有無やホログラムの違いは、目視により可能なので、真性品か偽性品かの判断を容易に行うことができる。

【0019】次に、情報記録領域 2 にホログラム 5 を形成した光ディスクの再生に好適な光ディスク再生装置について、図 7 を用いて説明する。一般的に、光ディスク再生装置では、光ディスクのビット部 7 の反射光量とビット 7 が形成されていないところとの反射光量との差を利用して、ビット情報を読み出し、再生信号として処理されている。このため、両部分の光量差が最大になるよう、それぞれの反射光の光路差を $\lambda/2$ にすべく、ビット深さ d を前述したように、 $\lambda/4$ にしている。ところで、ホログラム 5 の形成等によりビット 7 の深さ d が小さくなると、ビット部 7 での反射光の光量とビット 7 のないところでの反射光の光量との差が少なくなる。従って、情報記録領域 2 に形成したホログラム 5 を明瞭にするために、ホログラム 5 の凹凸差 d_1 を大きくすると(例えば、前述した $\lambda/10$ より大きくする)、光ディスクのビット情報を再生する際にホログラム 5 も再生される可能性が生じる一方で、反射率差の低下により、ビット情報を明瞭に再生できなくなる可能性も生じる。

【0020】そこで、本実施例の光ディスク再生装置では、ビット情報を読み出す信号レベルに、予めしきい値を設定しておき、このしきい値以下のときに信号として再生しないようにしている。具体的には、光ディスク再生装置を図 7 に示すように構成する。同図において、15 は光ディスク、16 はスピンドルモータ、17 は光ピックアップ、18 はサーボ回路、20 は光ピックアップ 17 を駆動させる光ピックアップ送り装置、19 はサーボ回路 18 及び光ピックアップ送り装置 20 を制御するアクセス制御部、21 はプリアンプ、22 はプリアンプ 21 からの信号のレベルがしきい値より大きいのか否かを判断する検出回路、23 は検出回路 22 でしきい値より大きいレベルの信号として判断された信号を EFM (Eight to Fourteen Modulation) 復調する CD デジタル信号処理部、24 は CD-ROM コントローラ、25 はホストシステムである。

【0021】光ディスク15から光ピックアップ17により読み出された信号はプリアンプ21によって増幅される。プリアンプ21によって増幅された信号は、検出回路22で、予め設定されているしきい値のレベルより大きいか否かが判断され、大きいと判断された信号がCDデジタル信号処理部23に出力される。この信号は、CDデジタル信号処理部23において、EFM復調され、その後、CD-ROMコントローラ24によりCD-ROMとしてのスクランブルが施され、ROMデータとしてホストシステム25に送られる。アクセス制御部19は、ホストシステム25の指示により、サーボ回路18やピックアップ送り装置20を制御して、光ピックアップ17の移動、スピンドルモータ16の回転量等の制御を実行する。

【0022】このように光ディスク再生装置を構成することにより、ホログラム5の凹凸差 d_1 を大きくしても、光ピックアップ17で読み取られた信号のレベルが、しきい値よりも小さければ、再生されないで、光ディスク15のビット情報を再生する際にホログラム5が再生されることはなく、且つ、ビット情報を明瞭に再生することができる。従って、ホログラム5の凹凸差 d_1 を大きくすること（例えば、前述した $\lambda/10$ より大きくする）ができるので、明瞭に目視することができるホログラム5を形成することができる。

【0023】次に、以上において説明した光ディスクの製造方法について説明する。ガラス等のディスク上に、ホトレジスト材料を用いて、読み出しに使用するコヒーレント光の波長の $1/4$ の薄膜を形成する。このディスクを情報記録媒体を作成するための原版とし、周知の方法でホトレジスト材料上に情報ビットパターンを書き込む、そして、さらに、ホトレジスト材料上に、図形、物体あるいは文字パターン等を被写体としたホログラムの干渉パターンを、ホログラム作成の周知の方法で作成する。なお、ホトレジスト上には、ホログラムの干渉パターンを作成してから、情報ビットパターンを書き込んでよい。その後、この原版を現像処理する。例えば、現像処理では、光の照射されたビット部のところ、及び、ホログラムの干渉縞の明部のみのホトレジスト材料を取り除く。ホログラムの干渉パターンの暗部になったところは感光しないのでホトレジスト材料は取り除かれな

い。このようにすると、原版にはビットとホログラムの凹凸が形成される。この原版をマスタ原版として、スタンパを周知の方法で作成する。以降は、このスタンパを用いて、通常の方法で光ディスクを作成する。

【0024】第4の実施例の光ディスク1c（図5に示す。）のように、ホログラム5を情報記録領域2に重ね合わせる時は、ビット7として情報信号を書き込む時の光の強度と、ホログラム作成時の光の強度を変えておく。即ち、ホログラム作成時の光の強度をビット7として情報信号を書き込む時の光の強度より小さくして、ホ

トレジスト材料を現像したとき、情報ビット7の深さ d がコヒーレント光の波長 λ の $1/4$ に、ホログラム5の凹凸差 d_1 がコヒーレント光の波長 λ の $1/10$ なるようにすればよい。この例では、ホトレジスト材料を、読み出しに使用するコヒーレント光の波長 λ の $1/4$ の薄膜に設定してあるので、ビット7として情報信号を書き込む時の光の強度のみで、ビット7内のホトレジストが除去されてしまい、ここに重ね合わされるホログラム5の作作用光の強度は、ビット7の形成に影響しない。

【0025】なお、第1の実施例の光ディスク1を作成する場合には、以上のように、ビット7とホログラム5とが共に形成されている一の原版を作成してもよいが、複数のビット7が形成される情報記録領域2の原版と、ホログラム5が形成される無記録領域3の原版とを、それぞれ、別々に作成し、その後、各原版を一つに組上げてよいし、個々の原版毎にスタンパを作成して、各スタンパを一つに組み上げてよい。このように、個々の領域2、3の原版等を別々に作成することにより、各作業を並行して行えるため、原版作成時間を短縮することができる。また、原版を単品でシリーズに作成するよりも、個々の部分を別々に作成する方が、作成途中で製作ミスが生じたときのリスクを小さくすることができる。更に、一つの光ディスクに対して、例えば情報記録内容を表現するホログラムを複数形成する場合には、比較的容易に、複数のホログラムを形成することができる。

【0026】なお、以上の実施例において、情報記録媒体の一つとして、光ディスクを例示したが、本発明は、これに限定されるものではなく、矩形状基板上にビットとして情報が記録されている光カードや、磁気を利用して再生する光磁気ディスクや磁気ディスクや磁気カードに関しても、本発明を適用してもよい。

【0027】

【発明の効果】本発明によれば、光又は磁気により再生可能な情報が記録されている母材自体にホログラムが形成されているので、真性品の情報記憶媒体の母材には、必ず、複製することが非常に困難なホログラムが形成されていることになり、真性品を偽造からより確実に保護することができる。さらに、ホログラムの有無、又はホログラムの違いは、目視により可能なので、真性品か偽性品かの判断を容易に行うことができる。

【図面の簡単な説明】

【図1】本発明に係る第1の実施例の光ディスクの正面図である。

【図2】図1におけるA-A線断面である。

【図3】本発明に係る第2の実施例の光ディスクの要部断面図である。

【図4】本発明に係る第3の実施例の光ディスクの要部断面図である。

【図5】本発明に係る第4の実施例の光ディスクの要部断面図である。

9

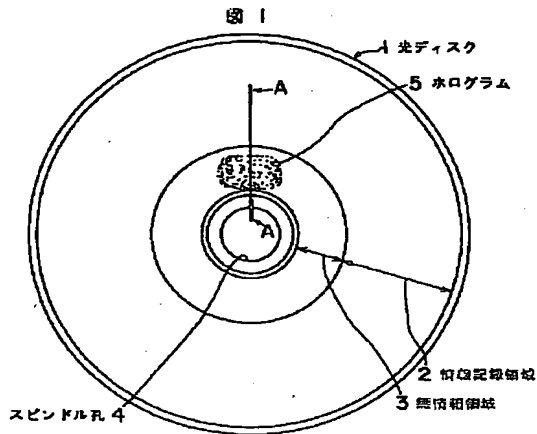
【図6】本発明に係る一実施例の光ディスクに設けたホログラムの凹凸差と情報ピットの深さとの関係を示す説明図である。

【図7】本発明に係る一実施例の光ディスク再生装置の回路ブロック図である。

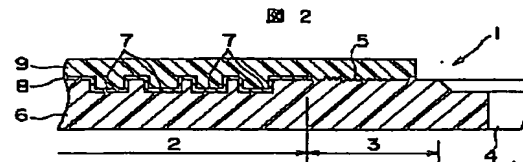
【符号の説明】

1, 1a, 1b, 1c…光ディスク、2…情報記録領域

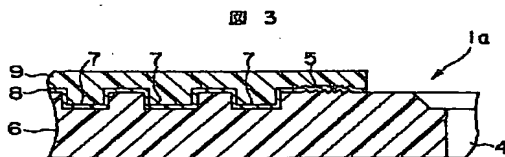
【図1】



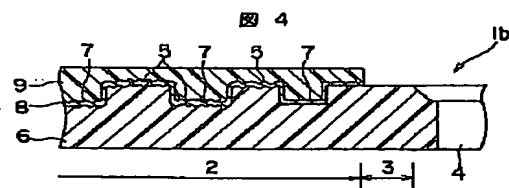
【図2】



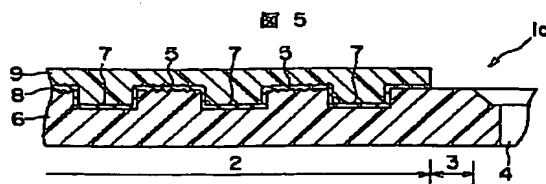
【図3】



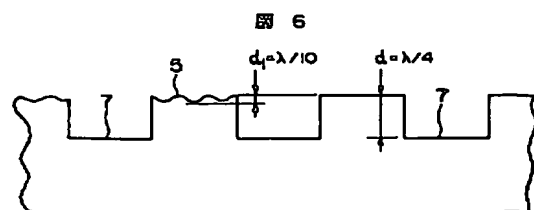
【図4】



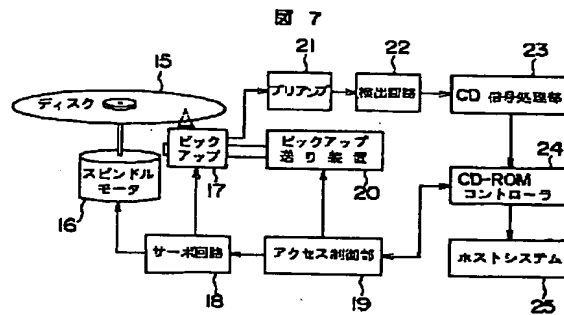
【図5】



【図6】



【図7】



フロントページの続き

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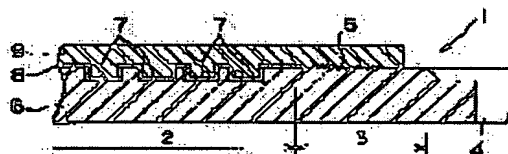
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(54) INFORMATION RECORDING MEDIUM AND ITS PRODUCTION

(57)Abstract:

PURPOSE: To surely identify whether an information recording medium is genuine or not by viewing by forming a hologram on a substrate.

CONSTITUTION: An optical disk is formed of a transparent substrate 6 consisting of glass, etc., information bits 7 formed on this substrate 6, a reflection layer 8, a protective layer 9, etc. The hologram 5 is formed as plural pieces of ruggedness of a depth smaller than the depth of the bits 7 on the substrate 6 of the non-information region 3 of this disk 1. The hologram 5 is not read by coherent light for reading the bit 7 information and is not reproduced. Then, whether the optical disk, etc., are genuine or not is always identified when the hologram 5 image is viewed, unlike the case of sticking a peelable hologram to the disk.



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[Date of registration]

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[Date of requesting appeal against examiner's decision of
 rejection]

[Date of extinction of right]

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CLAIMS

[Claim(s)]

[Claim 1] The information record medium characterized by forming the hologram in said substrate itself apart from the information using which two or more pits are recorded on the substrate as said pit in the information record medium currently formed as refreshable information of light.

[Claim 2] The information record medium according to claim 1 characterized by forming the transparent protective layer on the hologram currently formed in said substrate.

[Claim 3] It is the information record medium according to claim 1 or 2 characterized by being the concavo-convex difference which cannot read said hologram which said hologram was formed in said substrate as two or more irregularity, and was formed with two or more irregularity when said concavo-convex difference was smaller than the pit depth of said pit and this pit was read as information.

[Claim 4] It is the information record medium according to claim 1, 2, or 3 characterized by forming in said substrate the information record section in which said two or more pits are formed, and the non-information field in which this pit is not formed at all, and forming said hologram in said non-information field.

[Claim 5] It is the information record medium according to claim 1, 2, or 3 characterized by forming in said substrate the information record section in which said two or more pits are formed, and the non-information field in which this pit is not formed at all, and forming said hologram in said information record section.

[Claim 6] In the manufacture approach of an information record medium according to claim 1, 2, 3, 4, or 5 Apply a photoresist on a specific plate and the development of a counterpart lump and this photoresist is carried out for the interference pattern used as the pit pattern which serves as said pit on this photoresist, and said hologram. Remove only the part exposed on this photoresist and the original edition with which said pit and said hologram were formed is created. The manufacture approach of the information record medium characterized by creating La Stampa based on said original edition, creating said substrate with which said pit and said hologram were formed based on said La Stampa, and forming a reflecting layer and a protective layer on said substrate.

[Claim 7] The plate for information record sections for forming said information record section of said substrate in the manufacture approach of an information record medium according to claim 4, Prepare the plate for non-information fields for forming said non-information field, apply a photoresist on said plate for information record sections, and the development of a counterpart lump and this photoresist is carried out for the pit pattern which serves as said pit on this photoresist. While creating the original edition for information record sections with which only the part exposed on this photoresist was removed, and said pit was formed Apply a photoresist on said plate for non-information fields, and the development of a counterpart lump and this photoresist is carried out for the interference pattern which serves as said hologram on this photoresist. Remove only the part exposed on this photoresist, create the original edition for non-information fields with which said hologram was formed, and the original edition of 1 is created combining said original edition for information record sections, and said non-information field original edition. Create La Stampa based on the original edition of 1, or said original edition for information record sections and said non-information field original edition are combined. this – The manufacture approach of the information record medium characterized by creating direct La Stampa, creating said substrate with which said pit and said hologram were formed based on said La Stampa, and forming a reflecting layer and a protective layer on said substrate.

[Claim 8] The regenerative apparatus of the information record medium characterized by to have a decision means output the signal with which the signal level from the optical pickup which receives the reflected light from this information record medium while applying coherent light to said information record medium in the regenerative apparatus of an information record medium according to claim 5, and said optical pickup exceeds the level which judged whether it was the level defined beforehand and was defined beforehand, and a playback means reproduce the signal outputted from said decision means.

[Claim 9] The information record medium characterized by forming the hologram in said base material itself apart from said predetermined information in the information record medium with which refreshable information is recorded on the specific base material by light or the MAG.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the information record medium with which refreshable information is recorded by light or the MAG, and relates to the information record medium which it is an intrinsic thing, is a false thing, or can be especially judged by viewing, its manufacture approach, and its regenerative apparatus.

[0002]

[Description of the Prior Art] Conventionally, there is a thing indicated by JP,63-168397,B to aim at forged prevention, for example. With this technique, the so-called hologram sheet is stuck on cards, such as an ATM card, and the forged prevention of cards of drawing is in them.

[0003]

[Problem(s) to be Solved by the Invention] However, with said conventional technique, once a hologram sheet is removed, it becomes impossible to distinguish whether it is an intrinsic article or it is a false article, and there is a problem that an intrinsic article cannot fully be protected.

[0004] This invention was made paying attention to such a conventional trouble, and aims at offering the information record medium which can protect an intrinsic article from forgery more certainly, its manufacture approach, and its regenerative apparatus.

[0005]

[Means for Solving the Problem] The information storage for attaining said object is characterized by forming the hologram independently, as for this information at the base material itself on which refreshable information is recorded by light or the MAG.

[0006] Here, as said information storage medium, a refreshable thing is also contained by light with the MAG like an optical disk or an optical card like others, a magneto-optic disk and a magnetic disk, or a magnetic card. [thing / refreshable] Moreover, specifically, said base material is a concept in which others, a protective layer, a reflecting layer, etc. are contained, when an information storage medium is an optical disk. [substrate / with which the pit was formed]

[0007] Moreover, it is desirable that it is the concavo-convex difference which cannot read the hologram in which it was formed with two or more irregularity when the concavo-convex difference of two or more irregularity which forms a hologram in that by which two or more pits are formed in the substrate as refreshable information of light like an optical disk was smaller than the pit depth and said information storage read a pit as information. moreover, either among the information record sections and non-information fields which are formed on the substrate in this optical information storage -- or a hologram may be formed in both.

[0008] Moreover, the manufacture approach of the optical information storage medium for attaining said object Apply a photoresist on a specific plate and the development of a counterpart lump and this photoresist is carried out for the interference pattern used as the pit pattern and hologram which serve as a pit on this photoresist. Remove only the part exposed on this photoresist and the original edition with which said pit and said hologram were formed is created. La Stampa is created based on this original edition, the substrate with which said pit and said hologram were formed is created based on this La Stampa, and it is characterized by forming a reflecting layer and a protective layer on this substrate.

[0009] Moreover, the suitable regenerative apparatus for playback of the optical information record medium formed a hologram to an information-storage field is characterized by to have a decision means output the signal with which the signal level from the optical pickup which receives the reflected light from this information record medium, and this optical pickup exceeds the level which judged whether it was the level defined beforehand and defined beforehand while applying coherent light to an optical information record medium, and a playback means reproduce the signal outputted from this decision means.

[0010]

[Function] Since a hologram cannot perform faithful playback unless it makes in agreement the creation condition and its playback condition, it is dramatically difficult for reproducing itself faithfully. Moreover, since the hologram is formed in the base material itself on which refreshable information is recorded by light or the MAG, the hologram is surely formed in the base material of the information storage of intrinsic elegance. It seems that namely, it is removed from a base material and an intrinsic article, a false article, or distinction becomes impossible like a hologram sheet. Therefore, the storage can distinguish an intrinsic article or a false article certainly by the existence of a hologram, or the difference in a hologram. Moreover, by viewing, since the existence of a hologram and the difference in a hologram are possible, they can make a judgment of an intrinsic article or a false article easily.

[0011] moreover, an information storage like the so-called optical disk by what two or more pits are recorded on the substrate by light by as refreshable information If it is made the concavo-convex difference which cannot read the hologram formed with two or more irregularity in case it is smaller than the pit depth in the concavo-convex difference of the hologram formed in the substrate and a pit is read as information Pit information is clearly reproducible even if it forms a hologram in the information record section in which two or more pits are formed. Furthermore, since the hologram itself cannot be read even if it is going to apply a specific light to a pit and is going to read a pit as information, even if it is going to reproduce and reproduce an optical information record medium, it is not reproduced and a hologram cannot be reproduced simply.

[0012]

[Example] Hereafter, the various examples concerning this invention are explained using a drawing. First, the 1st example of the information record medium concerning this invention is explained using drawing 1 and drawing 2.

[0013] The information record medium of this example is an optical disk which records information in the shape of a pit on a substrate, reads information and is played by coherent light. As shown in drawing 1, the spindle hole 4 for the information record section 2 where pit-like information is recorded on the periphery side being formed, and the non-information field 3 being formed in that inner circumference side, and equipping a regenerative apparatus with this optical disk 1 in a core is formed. The hologram 5 is

formed in the non-information field 3. Drawing 2 is the A-A sectional view of drawing 1. an optical disk -- one -- for example, -- a polycarbonate -- an epoxy resin -- glass -- etc. -- being transparent -- a substrate -- six -- a substrate -- six -- information -- a record section -- two -- a top -- forming -- having had -- aluminum -- etc. -- from -- changing -- a reflecting layer -- eight -- a reflecting layer -- eight -- a top -- forming -- having had -- ultraviolet curing -- (-- UV --) -- resin -- etc. -- from -- becoming -- being transparent -- a protective layer -- nine -- having -- constituting -- having -- ****. Two or more pits 7 and 7 and -- are formed in the information record section 2 of a substrate 6 concentric circular or in the shape of a spiral. Moreover, the irregularity-like hologram 5 is formed in the non-information field 3 of a substrate 6.

[0014] Since the effect which it has on a reconstruction image even if a blemish sticks has few the parts, there is not necessarily no need of covering positively, but the hologram 5 forms the protective layer 9 also on the hologram 5 formed in the non-information field 3 here in order to prevent with [to a hologram 5] a blemish thoroughly. Under the present circumstances, while using a transparent material as a protective layer 9, it is necessary to give a difference to the refractive index of the ingredient which forms a substrate 6 and a protective layer 9 so that wave-front-reconstruction light may be obtained from the hologram 5 formed in the transparent substrate 6. In addition, a hologram 5 is good the anything from which a reconstruction image is acquired by the white light or the laser beam. Since wave front reconstruction of the body currently recorded as a hologram 5, a graphic form, the character pattern, etc. is carried out when light is irradiated at a hologram 5, this body, a graphic form, a character pattern, etc. can be recognized by viewing. Here, as the body recorded as a hologram 5, a graphic form, a character pattern, etc., the thing showing the manufacturer of an optical disk 1, the thing which shows the content of the pit information currently recorded on the optical disk 1 to some extent can be considered.

[0015] Next, the optical disk of the 2nd example concerning this invention is explained using drawing 3. Optical disk 1a of this example is the thing in which the reflecting layer 8 was formed also on the hologram 5, in addition is related, and is the same as that of the 1st example. Thus, the wave-front-reconstruction quantity of light by echo increases, and it becomes easy to view the reconstruction image of a hologram 5 by forming a reflecting layer 8 also on the concavo-convex hologram 5.

[0016] Next, the optical disk of the 3rd example concerning this invention and the 4th example is explained using drawing 4 and drawing 5, respectively. Optical disk 1b of the 3rd example forms a hologram 5 in a part of information record section 2 (or a part all over the districts is sufficient), as shown in drawing 4. The hologram 5 is formed over both the place which does not have the pit 7 of the information record section 2, and in a pit 7. Moreover, as shown in drawing 5, optical disk 1c of the 4th example forms a hologram 5 in the place which does not have the pit 7 in the information record section 2. Thus, if a hologram 5 is formed in the information record section 2, hologram 5 the very thing can be enlarged and the body currently recorded as a hologram 5, a graphic form, a character pattern, etc. can be viewed more easily. However, in forming a hologram 5 in the information record section 2, in case it reproduces pit information in this way, the information currently recorded as a hologram 5 needs to be made not to be reproduced.

[0017] Here, in case the pit information on the optical disks 1b and 1c of the 3rd and 4th examples is reproduced using drawing 6, conditions not to reproduce the information currently recorded as a hologram 5 are explained. In addition, in this drawing, in order to simplify a drawing, the reflecting layer and the protective layer are not drawn. Generally, in an optical disk, depth d of the information pit 7 is $1/4$ of the wavelength λ of the coherent light which reproduces the information pit 7. In the common optical disk regenerative apparatus for such an optical disk, $1/10$ or less irregularity of the wavelength λ of coherent light is unreproducible. So, in the optical disks 1b and 1c of the 3rd and 4th examples, the concavo-convex difference d1 of a hologram 5 is made or less [of the wavelength λ of coherent light] into $1/10$. In addition, although the concavo-convex difference d1 of a hologram 5 is made or less [of the wavelength λ of coherent light] into $1/10$, since it becomes settled in relation with an optical disk regenerative apparatus, this should just be below the value that the concavo-convex difference d1 of a hologram 5 does not need to be $\lambda/10$, and cannot reproduce a hologram 5 as information with an optical disk unit to the last here. Thus, if it sets, since irregularity of a hologram 5 cannot read hologram 5 the very thing in addition to one with it difficult [to reproduce faithfully], it becomes very difficult to reproduce such optical disks 1b and 1c.

[0018] As mentioned above, in the optical disks 1, 1a, 1b, and 1c in each example, since the hologram 5 is formed in substrate 6 the very thing and it is difficult to reproduce the hologram itself faithfully, without being removed from a substrate like a hologram sheet, the optical disk can distinguish intrinsic elegance or a false article from the existence of the hologram formed in substrate 6 the very thing, or the difference in a hologram certainly. Moreover, by viewing, since the existence of a hologram and the difference in a hologram are possible, they can make a judgment of an intrinsic article or a false article easily.

[0019] Next, the suitable optical disk regenerative apparatus for playback of the optical disk in which the hologram 5 was formed to the information record section 2 is explained using drawing 7. Generally, in the optical disk regenerative apparatus, using the difference of the amount of reflected lights of the pit section 7 of an optical disk, and the amount of reflected lights in which the pit 7 is not formed, pit information is read and it is processed as a regenerative signal. For this reason, that the optical path difference of each reflected light should be made $\lambda/2$, as pit depth d was mentioned above, it is made $\lambda/4$, so that the quantity of light difference of both parts may become max. By the way, if depth d of a pit 7 becomes small by formation of a hologram 5 etc., the difference of the quantity of light of the reflected light in the pit section 7 and the quantity of light of the reflected light without a pit 7 will decrease. Therefore, while possibility that a hologram 5 will also be reproduced will arise in case the pit information on an optical disk is reproduced if the concavo-convex difference d1 of a hologram 5 is enlarged (for example, it is made larger than $\lambda/10$ mentioned above) in order to make clear the hologram 5 formed in the information record section 2, possibility that it becomes impossible to reproduce pit information clearly is also produced by lowering of a reflection factor difference.

[0020] Then, he sets the threshold as the signal level which reads pit information beforehand, and is trying not to reproduce as a signal in the optical disk regenerative apparatus of this example at the time of below this threshold. Specifically, an optical disk regenerative apparatus is constituted, as shown in drawing 7. In this drawing 15 a spindle motor and 17 for an optical disk and 16 An optical pickup. The optical pickup feed gear with which 18 drives a servo circuit and 20 makes an optical pickup 17 drive, The access-control section by which 19 controls the servo circuit 18 and the optical pickup feed gear 20, The detector which judges whether the level of 21 of the signal from pre amplifier 21 is [pre amplifier and 22] larger than a threshold, As for CD digital-signal-processing section which carries out the EFM (Eight to Fourteen Modulation) recovery of the signal judged as a signal of the level in a detector 22 with 23 [larger] than a threshold, and 24, a CD-ROM controller and 25 are host systems.

[0021] The signal in which reading appearance was carried out by the optical pickup 17 from the optical disk 15 is amplified by pre amplifier 21. The signal amplified by pre amplifier 21 is a detector 22, and the signal which it was judged whether it is size ***** and was judged to be large from the level of the threshold set up beforehand is outputted to CD digital-signal-processing section 23. In CD digital-signal-processing section 23, an EFM recovery is carried out, the scramble as a CD-ROM is given by the CD-ROM controller 24 after that, and this signal is sent to a host system 25 as ROM data. The access-control section 19 controls the servo circuit 18 and the pickup feed gear 20 by directions of a host system 25, and performs control of migration of an optical pickup 17, the

rotation of a spindle motor 16, etc. with them.

[0022] Thus, since the level of the signal read by the optical pickup 17 will not be reproduced if it is smaller than a threshold even if it enlarges the concavo-convex difference $d1$ of a hologram 5 by constituting an optical disk regenerative apparatus, in case the pit information on an optical disk 15 is reproduced, a hologram 5 is not reproduced and pit information can be reproduced clearly. Therefore, since the concavo-convex difference $d1$ of a hologram 5 can be enlarged (for example, it is made larger than $\lambda/10$ mentioned above), the hologram 5 which can be viewed clearly can be formed.

[0023] Next, the manufacture approach of the optical disk explained above is explained. On disks, such as glass, a photoresist ingredient is used and one fourth of the thin films of the wavelength of the coherent light used for read-out are formed. This disk is used as the original edition for creating an information record medium, an information pit pattern is written in on a photoresist ingredient by the well-known approach, and the interference pattern of the hologram which used the graphic form, the body, or the character pattern as the photographic subject on the photoresist ingredient further is created by the approach of common knowledge hologram creation. In addition, on a photoresist, after creating the interference pattern of a hologram, you may also write in an information pit pattern. Then, the development of this original edition is carried out. For example, in a development, the place of the pit section by which light was irradiated, and the photoresist ingredient of only the bright section of the interference fringe of a hologram are removed. Since the place which became the dark space of the interference pattern of a hologram is not exposed, a photoresist ingredient is not removed. If it does in this way, the irregularity of a pit and a hologram will be formed in the original edition. La Stampa is created by the well-known approach by using this original edition as the master original edition. Henceforth, an optical disk is created by the usual approach using this La Stampa.

[0024] Like optical disk 1c (shown in drawing 5.) of the 4th example, when laying a hologram 5 on top of the information record section 2, the luminous intensity when writing in an information signal as a pit 7 and the luminous intensity of hologram creation time are changed. Namely, what is necessary is just to make it the wavelength λ of coherent light set [depth d of the information pit 7] to one fourth of the wavelength λ of coherent light by the concavo-convex difference $d1$ of a hologram $5 \lambda/10$, when it is made smaller than the luminous intensity when writing in an information signal by making luminous intensity of hologram creation time into a pit 7 and a photoresist ingredient is developed. In this example, since it is set as one fourth of the thin films of the wavelength λ of the coherent light which uses a photoresist ingredient for read-out, the photoresist in a pit 7 will be removed only by the luminous intensity when writing in an information signal as a pit 7, and the luminous intensity for creation of the hologram 5 piled up here does not influence formation of a pit 7.

[0025] in addition, in creating the optical disk 1 of the 1st example As mentioned above, the original edition of the information record section 2 in which two or more pits 7 are formed although the original edition of 1 with which both the pit 7 and the hologram 5 are formed may be created, The original edition of the non-record section 3 in which a hologram 5 is formed may be created independently, respectively, you may finish setting up each original edition to one after that, La Stampa may be created for each original edition of every, and you may finish setting up each La Stampa to one. Thus, since each activity can be done in parallel by creating the original edition of each fields 2 and 3 etc. independently, original edition creation time can be shortened. Moreover, the direction which creates each part independently is in the middle of creation rather than creating the original edition in series individually, and a risk when a fabrication mistake arises can be made small. Furthermore, when forming two or more holograms expressing the content of information record as opposed to one optical disk, two or more holograms can be formed comparatively easily.

[0026] In addition, in the above example, as one of the information record media, although the optical disk was illustrated, this invention is not limited to this and may apply this invention also about the optical card with which information is recorded on the rectangle-like substrate as a pit, the magneto-optic disk played using the MAG, a magnetic disk, or a magnetic card.

[0027]

[Effect of the Invention] Since the hologram is formed in the base material itself on which refreshable information is recorded by light or the MAG according to this invention, the hologram with it surely very difficult [to reproduce] for the base material of the information storage of an intrinsic article will be formed, and intrinsic elegance can be more certainly protected from forgery. Furthermore, by viewing, since the existence of a hologram or the difference in a hologram is possible, it can make a judgment of an intrinsic article or a false article easily.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the front view of the optical disk of the 1st example concerning this invention.

[Drawing 2] It is an A-A line cross section in drawing 1.

[Drawing 3] It is the important section sectional view of the optical disk of the 2nd example concerning this invention.

[Drawing 4] It is the important section sectional view of the optical disk of the 3rd example concerning this invention.

[Drawing 5] It is the important section sectional view of the optical disk of the 4th example concerning this invention.

[Drawing 6] It is the explanatory view showing the relation between the concavo-convex difference of a hologram prepared in the optical disk of one example concerning this invention, and the depth of an information pit.

[Drawing 7] It is the circuit block diagram of the optical disk regenerative apparatus of one example concerning this invention.

[Description of Notations]

1, 1a, 1b, a 1c-- optical disk, 2 -- information record section, and 3 -- a heartless news field, 4 -- spindle hole, 5 -- hologram, and 6 -- a substrate, 7 -- information pit, 8 -- reflecting layer, and 9 -- a protective layer, 16 -- spindle motor, 17 -- light peak rise, and 18 -- a servo circuit, 19 -- access-control section, 20 -- optical pickup feed gear, and 22 -- a detector, the 23 --CD digital-signal-processing section, and a 24 --CD-ROM controller.

[Translation done.]

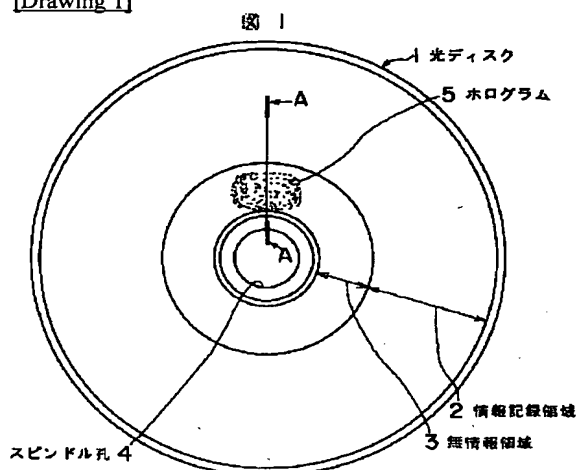
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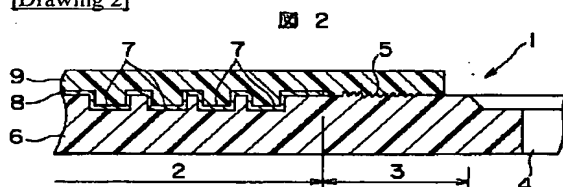
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DRAWINGS

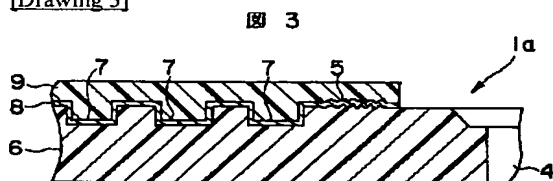
[Drawing 1]



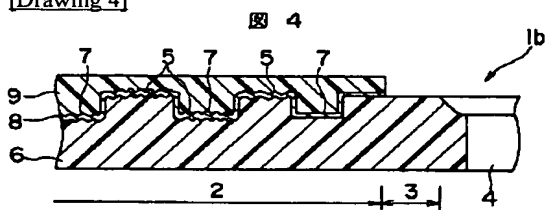
[Drawing 2]



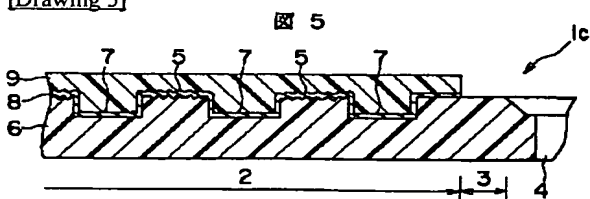
[Drawing 3]



[Drawing 4]

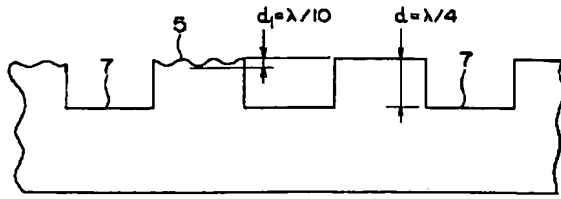


[Drawing 5]



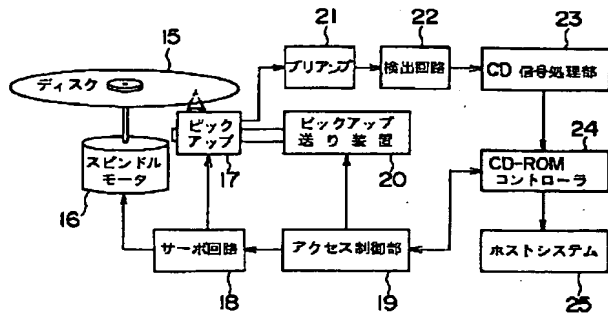
[Drawing 6]

図 6



[Drawing 7]

図 7



[Translation done.]

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CORRECTION OR AMENDMENT

[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law
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G11B	7/24	531
B42D	15/10	501
511		
G03H	1/18	
G11B	7/26	531
19/04	501	

[FI]

G11B	7/24	531	Z
B42D	15/10	501	G
511			
G03H	1/18		
G11B	7/26	531	
19/04	501	H	

[Procedure amendment]
 [Filing Date] October 8, Heisei 11 (1999. 10.8)

[Procedure amendment 1]

[Document to be Amended] Description

[Item(s) to be Amended] Claim

[Method of Amendment] Modification

[Proposed Amendment]

[Claim(s)]

[Claim 1] It is the information record medium with which two or more pits are formed in the substrate as refreshable information of light,

On said substrate, the information record section in which said two or more pits are formed, and the non-information field in which this pit is not formed are formed,

The information record medium characterized by forming the hologram in said information record section.

[Claim 2] In the manufacture approach of an information record medium according to claim 1,

A photoresist is applied on a specific plate, only the part which carried out the development of the interference pattern used as said pit, the becoming pit pattern, and said hologram, and exposed the counterpart lump and this photoresist for it on this photoresist on this photoresist is removed, and the original edition with which said pit and said hologram were formed is created,

La Stampa is created based on said original edition,

Based on said La Stampa, said substrate with which said pit and said hologram were formed is created,

The manufacture approach of the information record medium characterized by forming a reflecting layer and a protective layer on said substrate.

[Claim 3] In the manufacture approach of an information record medium that are the information record medium with which two or more pits are formed in the substrate as refreshable information of light, the information record section in which these two or more pits are formed, and the non-information field in which this pit is not formed are formed on this substrate, and the hologram is formed in this non-information field,

The plate for information record sections for forming said information record section of said substrate and the plate for non-information fields for forming said non-information field are prepared,

While creating the original edition for information record sections with which the photoresist was applied on said plate for information record sections, only the part which carried out the development of said pit and the becoming pit pattern, and exposed the counterpart lump and this photoresist for them on this photoresist on this photoresist was removed, and said pit was formed,

A photoresist is applied on said plate for non-information fields, only the part which carried out the development of the interference pattern used as said hologram, and exposed the counterpart lump and this photoresist for it on this photoresist on this photoresist is removed, and the original edition for non-information fields with which said hologram was formed is created,

said original edition for information record sections, and said non-information field original edition -- combining -- the original edition

of 1 -- creating -- this -- the original edition of 1 -- origin -- La Stampa -- creating -- or said original edition for information record sections and said non-information field original edition -- combining -- direct La Stampa -- creating

Based on said La Stampa, said substrate with which said pit and said hologram were formed is created,

The manufacture approach of the information record medium characterized by forming a reflecting layer and a protective layer on said substrate.

[Claim 4] In the regenerative apparatus of an information record medium according to claim 1,

The optical pickup which receives the reflected light from this information record medium while applying coherent light to said information record medium,

A decision means to output the signal with which the signal level from said optical pickup exceeds the level which judged whether it was the level defined beforehand and was defined beforehand,

A playback means to reproduce the signal outputted from said decision means,

preparation ***** -- the regenerative apparatus of the information record medium characterized by things.

[Procedure amendment 2]

[Document to be Amended] Description

[Item(s) to be Amended] 0005

[Method of Amendment] Modification

[Proposed Amendment]

[0005]

[Means for Solving the Problem] The information storage medium for attaining said object is an information record medium with which two or more pits are formed in the substrate as refreshable information of light, and is characterized by forming the information record section in which said two or more pits are formed, and the non-information field in which this pit is not formed on said substrate, and forming the hologram in said information record section.

[Procedure amendment 3]

[Document to be Amended] Description

[Item(s) to be Amended] 0006

[Method of Amendment] Deletion

[Procedure amendment 4]

[Document to be Amended] Description

[Item(s) to be Amended] 0007

[Method of Amendment] Modification
 [Proposed Amendment]

[0007] The manufacture approach of said information record medium applies a photoresist on a specific plate, and the development of a counterpart lump and this photoresist is carried out for the interference pattern used as the pit pattern which serves as said pit on this photoresist, and said hologram here. Remove only the part exposed on this photoresist and the original edition with which said pit and said hologram were formed is created. La Stampa is created based on said original edition, said substrate with which said pit and said hologram were formed is created based on said La Stampa, and it is characterized by forming a reflecting layer and a protective layer on said substrate.

[Procedure amendment 5]

[Document to be Amended] Description

[Item(s) to be Amended] 0008

[Method of Amendment] Modification

[Proposed Amendment]

[0008] Moreover, the manufacture approach of other information record media for attaining said object It is the information record medium with which two or more pits are formed in the substrate as refreshable information of light. On this substrate The information record section in which these two or more pits are formed, and the non-information field in which this pit is not formed are formed. In this non-information field The plate for information record sections for forming said information record section of said substrate in the manufacture approach of an information record medium that the hologram is formed, Prepare the plate for non-information fields for forming said non-information field, apply a photoresist on said plate for information record sections, and the development of a counterpart lump and this photoresist is carried out for the pit pattern which serves as said pit on this photoresist. While creating the original edition for information record sections with which only the part exposed on this photoresist was removed, and said pit was formed Apply a photoresist on said plate for non-information fields, and the development of a counterpart lump and this photoresist is carried out for the interference pattern which serves as said hologram on this photoresist. Remove only the part exposed on this photoresist, create the original edition for non-information fields with which said hologram was formed, and the original edition of 1 is created combining said original edition for information record sections, and said non-information field original edition. Create La Stampa based on the original edition of 1, or said original edition for information record sections and said non-information field original edition are combined. this -- Direct La Stampa is created, said substrate with which said pit and said hologram were formed is created based on said La Stampa, and it is characterized by forming a reflecting layer and a protective layer on said substrate.

[Translation done.]